

# *Heat Stress and Work in the Era of Climate Change:*

*What We Know, and What We  
Need to Learn*

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### About the Authors

The Climate Justice Research Centre (CJRC), at the University of Technology Sydney, has been investigating the implications of high temperatures and heat stress for Australian workers, their representatives and other stakeholders. In November 2019, the CJRC partnered with the Centre for Future Work for a workshop on heat stress for workers. This collaboration continues with this publication. The report overviews the pressing concern of heat stress in the era of climate change. More information on the Centre's heat stress work is available on our website, [toohottowork.org](http://toohottowork.org).

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# Summary

This report outlines why working in extreme heat is a growing and urgent issue for workers. It explains the general impacts of heat stress; it discusses recent research on its physical and mental effects; and it makes suggestions for future areas of inquiry and action.

Climate change is altering weather patterns, resulting in unusual and extreme conditions. This includes more hot days and longer heatwaves, which can push the physical capacity of workers beyond what is safe. Some workers are particularly vulnerable to the effects of these conditions. Our research identified four key groups of workers as being at high risk of heat stress:

- workers who labour inside, in environments with poor climate control, or whose work requires them to be exposed to heat and humidity.
- outdoor workers, especially those who are weather-exposed.
- workers moving between different climates as part of their work (i.e., moving between extreme heat and cold).
- workers whose roles expose them to situational extreme heat, such as emergency workers and firefighters.

High heat also impacts many workers in less direct ways: for example, poor sleep during a hot night can make it harder to work safely the next day, and working in extreme heat can make the drive home from work more dangerous.

Questions of social justice are deeply embedded in climate change and rising temperatures. Workers whose jobs are less secure — for example, temporary workers, on-demand workers and migrant workers — are just some of the groups who are at greater risk.

As many workers experienced over this past summer, in relation to the unprecedented bushfires, appropriate policies and plans are not always in place to ensure that people are

protected from dangerous conditions that could cause illness or injury to themselves or others.

This report has three main sections:

- Section One (Background) provides an overview of heat stress and the problems it presents for workers.
- Section Two (Heat Stress at Work—Case Studies) describes the findings from two detailed case studies of the impacts of high heat on workers. The first case study examines the experience of outdoor council workers and delivery riders in Sydney. The second case study reports on workers in the building and construction industry in New South Wales.
- Section Three (What Are Unions Doing?) details how trade unions in Australia are responding to the growing impacts of heat stress workers across different industries. This section helps map the complexities faced by workers and their unions in dealing with heat stress in the workplace.

## PROJECT GENESIS

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The Climate Justice Research Centre (CJRC) at University of Technology Sydney brings together researchers examining the socio-political drivers of climate justice, and to define a new research agenda on the centrality of justice concerns for climate action. The *Too Hot to Work Project* examines how workers are experiencing high heat and heat stress in an era of climate change. This report summarises the key findings of our research so far, which has focused on the experience and perspectives of outdoor workers and their trade unions. Over the coming months we will be expanding our project to focus on how climatic heat stress is impacting other groups of workers (including indoor workers), and on the efforts of workers to gain better working conditions.

## PROJECT FINDINGS

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1. Heat stress poses serious health and safety risks for many workers across Australia. As hot days and heatwaves increase in frequency and become more intense, these risks increase. Outdoor workers, those working indoors without temperature controls and ventilation, workers moving between different climates, and emergency service workers are particularly at risk.
  - Australia must act on the causes of rising temperatures and changing weather patterns, and protect workers and the wider community from the effects of climate change.
2. Current labour protections, including health and safety laws, are inadequate. Many workers say that OHS policies might seem to offer protection, but that in practice this is not the case. Workers say that employers do not want work to stop even when heat stress risk is very high, and that employers prioritise productivity over their health and safety. Other workers do not have access to basic health and safety protections — such as safety equipment, breaks, or the ability to stop work — at all. The hazardous heatwaves, air quality, and bushfire smoke over the recent summer has emphasised that current OHS regulations are ill prepared for the impacts of climate change.
  - Australian Commonwealth and state governments must urgently review the management of the current and likely impacts of climate change for workers, and develop national and state-based regulatory frameworks that provide strong protection in relation to heat stress and bushfire smoke. Workers, and their representative organisations, must be centrally involved in this process.
  - Government and employers must be required to provide adequate resourcing for at-risk workers, such as high standard Personal Protective Equipment (PPE), adequate hydration while at work, regular breaks, acclimatisation policies, and sufficient personnel to ensure workers can take relieved for recovery time in situations where they cannot stop work (such as emergencies).

- Greater resources must be provided to unions and employers to train health and safety representatives, and ensure workers and employers understand their rights and legal duties in relation to heat stress.
3. The conditions of a person's employment fundamentally shape their experience of heat stress. Workers who are employed casually, who work in labour hire arrangements, or who are gig workers, can have less capacity to take action on the effects of heat stress. While workers with some autonomy over their work schedules may be able to reschedule strenuous work in the event of extreme heat, others such as on-demand workers are externally 'paced', and are unable to adjust their work to maintain thermal comfort.
- Any review of national and state-based framework to protect workers from heat stress must address its impact on vulnerable workers, including workers in casualised working arrangements with minimal protections.
  - Current laws should be strengthened to ensure workers do not lose income when unable to work due to heat stress.
  - Governments need to establish clear and accessible occupational health and safety pathways around heat stress, which empower workers to take mitigating action without fear of reprisal.
  - On-demand workers must be afforded greater protections to ensure health and safety and fair income maintenance in periods when they need to work more slowly or take breaks.

# SECTION ONE: Background

## WHAT IS HEAT STRESS?

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As the International Labor Organization (ILO) has recognised, the increase in global temperatures, driven by climate change, directly threatens the working conditions of millions of workers worldwide.<sup>1</sup> Heat from rising temperatures in workplaces has been identified as an urgent public health issue, and a major threat to safe and decent working conditions. The *Special Report on Global Warming of 1.5°C* published by the Intergovernmental Panel on Climate Change (IPCC) warns that with continued climate change, worker safety during the hottest months of the year will be increasingly compromised.<sup>2</sup> In 2016 the United Nations (UN) released a major report, *Climate Change and Labour: Impacts of Heat in the Workplace*, which highlighted the rapid increase in daylight working hours lost due to over-heating, and which stressed threats to livelihood and health.<sup>3</sup> Most recently, in July 2019, the ILO released a major report<sup>4</sup> on the impact of rising heat on decent work and productivity. The report showed that increased rates of heat stress under climate change pose a direct threat to working conditions.

‘Heat stress’ refers to heat received in excess of the level which a body can tolerate without some physiological impairment. In extreme heat, workers may become severely dehydrated, nauseous, dizzy, fatigued, stressed and ill. Workers labouring in high heat

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<sup>1</sup> See ILO (2019), *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*, Geneva: ILO ([https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms\\_711919.pdf](https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_711919.pdf)).

<sup>2</sup> IPCC Special Report 15 (IPCC SR15), Chapter 3.4.7.1: Hoegh-Guldberg, O., Jacob, D., Taylor, M., Bindi, M., Brown, S., Camilloni, I., Diedhiou, A., Djalante, R., Ebi, K.L., Engelbrecht, F., Guiot, J., Hijjoka, Y., Mehrotra, S., Payne, A., Seneviratne, S.I., Thomas, A., Warren, R. and Zhou, G. (2018) ‘Impacts of 1.5°C global warming on natural and human systems’, in IPCC, *Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (<https://www.ipcc.ch/sr15/>).

<sup>3</sup> UNDP (2016) *Climate change and labour: Impacts of heat in the workplace*, with UNI-Global, ILO, ITUC, ACT Alliance, IOM, and WHO, New York: UNDP.

<sup>4</sup> ILO (2019), *Working on a warmer planet: The impact of heat stress on labour productivity and decent work*, Geneva: ILO ([https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms\\_711919.pdf](https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_711919.pdf)).

may also be more prone to lapses in concentration and may suffer from reduced decision-making abilities.

## WHICH WORKERS ARE AT RISK?

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Australian studies on workplace heat have established heat stress as a major issue across many classes of industries and occupations. Specific industry-based studies have examined the incidence and effects of heat exhaustion for particular groups of workers, including: shearers in inland SA and western NSW;<sup>5</sup> miners at Mount Isa in QLD,<sup>6</sup> northwestern Australia,<sup>7</sup> and Coppabella in QLD;<sup>8</sup> rural bushfire fighters;<sup>9</sup> outdoor council workers in Adelaide, SA<sup>10</sup> and tropical northern QLD;<sup>11</sup> power station maintenance workers in the NT;<sup>12</sup> and medical emergency response teams in Yarrowonga, NT.<sup>13</sup>

**Outdoor workers** are particularly vulnerable to high heat and humidity, as well as to other potentially harmful environmental conditions such as solar ultraviolet (UV) radiation, pollution, dust and smoke. These workers include construction workers, agricultural

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<sup>5</sup> Gun, R.T. and Budd, G.M. (1995) 'Effects of thermal, personal and behavioural factors on the physiological strain, thermal comfort and productivity of Australian shearers in hot weather', *Ergonomics*, vol 38, pp. 1368–84.

<sup>6</sup> Donoghue, A.M., Sinclair, M.J. and Bates, G.P. (2000) 'Heat exhaustion in a deep underground metalliferous mine', *Occupational and Environmental Medicine*, vol 57, pp. 165–74.

<sup>7</sup> Peiffer, J.J. and Abbiss, C.R. (2013) 'Thermal stress in North Western Australian iron ore mining staff', *Annals of Occupational Hygiene*, vol 57, pp. 519–27.

<sup>8</sup> Hunt, A.P., Parker, A.W. and Stewart, I.B. (2014) 'Heat strain and hydration status of surface mine blast crew workers', *Occupational Environmental Medicine/American College of Occupational Environmental Medicine*, vol 56, pp. 409–14.

<sup>9</sup> Raines, J., Larsen, B., Nichols, D. and Aisbett, B. (2011) *Hydration of Australian rural bushfire fighters*, Fire Note, Melbourne: Bushfire Cooperative Research Centre and the Australasian Fire and Emergency Service Authorities Council, 80, pp. 1–4.

<sup>10</sup> Lao, J., Hansen, A., Nitschke, M., Hanson-Easey, S. and Pisaniello, D. (2016) 'Working smart: An exploration of council workers' experiences and perceptions of heat in Adelaide, South Australia', *Safety Science*, vol 82, pp. 228–35.

<sup>11</sup> Wade, H., Sinclair, J. and Brownsburger, C. (2013) 'Wearing long pants while working outdoors in the tropics does not yield higher body temperatures', *Australian and New Zealand Journal of Public Health*, vol 37, pp. 70–5.

<sup>12</sup> Finn, J.P. (2010) 'Heat strain in power station maintenance workers', *Journal of Health Safety and Environment*, vol 26, pp. 379–88.

<sup>13</sup> Brearley, M.B., Heaney, M.F. and Norton, I.N. (2013) 'Physiological responses of medical team members to a simulated emergency in tropical field conditions', *Prehospital and Disaster Medicine*, vol 28, pp. 139–44.

workers, gardeners, emergency and essential service workers, traffic controllers, delivery workers, street vendors and professional sports players.

**Indoor workers** who do not have access to adequate cooling or ventilation, or who work with or near equipment and other things that radiate heat, are also at risk. People working in factories, workshops, warehouses, schools, aged care homes, laundries, kitchens and cafés often fall into this category. Climate change can exacerbate heat stress faced by indoor workers, by intensifying the general level of heat.

**Emergency service workers** are often vulnerable, because their busiest times can occur during heat stress emergencies. This category of workers includes firefighters, police officers, ambulance and rescue workers, State Emergency Service Workers and those who might need to urgently fix infrastructure (like water and electricity services) during high heat.

Many workers also **move between different climates**—such as emergency workers, logistics workers, transport workers, cleaners, and workers making deliveries or house calls. This movement presents its own risks, as acclimatisation to temperature conditions is critical. Casual or contract workers, Fly In Fly Out (FIFO) workers, migrant workers, workers with minimal or no on-the-job training, and workers returning from leave may also be expected to work in high-heat conditions before they can safely acclimatise to their new environment.

Other requirements of work can place further risks on all sorts of workers, such as the requirement to wear impermeable or semi-permeable personal protective equipment (PPE) at work, or the requirement to work according to an ‘external pace’ set by the speed of machines or other technology.

As the impacts of high heat and heat stress tend to accumulate, many workers are also at risk from the delayed effects of heat stress—for example, from a lack of sleep the night before, or a more difficult journey into work. More broadly, climate change processes, including increases in extreme heat, impact the broader processes of work life longevity, job security and even the ability to sustain life, consequently affecting all workers.

Climate change also increases the frequency and intensity of extreme weather events, such as dangerous storms and bushfires, thereby directly increasing workloads and risks for workers in particular sectors—most particularly, those working in emergency services.

For example, during major heatwaves in Australia, public health services come under increasing demand, and ambulance call-outs increase.<sup>14</sup>

## WHAT ARE THE RISKS FOR WORKERS?

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In Australia, heat exposure has killed more people than all other natural hazards combined,<sup>15</sup> and workers in Australia are particularly vulnerable to the impacts of extreme heat. Australian studies focusing on heat stress, work and productivity have found a positive association between the rate of occupational injury claims and higher ambient temperatures.<sup>16</sup> Heat exposure can increase the risk of workplace accidents through physical fatigue, the misuse of equipment and reduced mental capacity.<sup>17</sup> Workers may become less alert, and they may have slower response speeds and poorer reasoning abilities—factors which increase risks for injury and fatalities.<sup>18</sup>

At above 35°C, the risk of heat stress for workers engaging in heavy manual labour is high,<sup>19</sup> as physical exertion makes metabolising heat more difficult. Nonetheless, it is common for workers to continue to work ‘beyond’ their heat tolerance. One qualitative study in SA found that 30% of people working outdoors had experienced heat-related injuries, and only 20% of the employees surveyed stated that their work would cease when the temperature exceeded 40°C.<sup>20</sup> Half of those surveyed had concerns about extreme heat and strongly favoured more training, regulation and workplace changes to

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<sup>14</sup> See: Schaffer, A., Muscatello, D., Broome, R., Corbett, S. and Smith, W. (2012) ‘Emergency department visits, ambulance calls, and mortality associated with an exceptional heat wave in Sydney, Australia, 2011: A time-series analysis’, *Environmental Health*, vol 11, no 3; Nitschke, M., Tucker, G., Hansen, A., Williams, S., Zhang, Y. and Bi, P. (2011) ‘Impact of two recent extreme heat episodes on morbidity and mortality in Adelaide, South Australia: A case-series analysis’, *Environmental Health*, vol 10, p. 42.

<sup>15</sup> Oppermann, E., Brearley, M., Law, L., Smith, J., Clough, A. and Zander, K. (2017) *WIREs Clim Change*, vol 8, July/August 2017, doi: 10.1002/wcc.468.

<sup>16</sup> Xiang, J., Hansen, A., Pisaniello, D. & Bi, P. 2015, ‘Extreme heat and occupational heat illnesses in South Australia, 2001–2010’, *Occupational and environmental medicine*, vol 72, no 8, pp. 580-6.

<sup>17</sup> Rowlinson, S., YunyanJia, A., Li, B. and ChuanjingJu, C. (2014) ‘Management of climatic heat stress risk in construction: A review of practices, methodologies, and future research’, *Accident Analysis & Prevention*, vol 66, pp. 187–98.

<sup>18</sup> Chia, C.-F., Changa, T.-C. and Ting, H.-I. (2005) ‘Accident patterns and prevention measures for fatal occupational falls in the construction industry’, *Applied Ergonomics*, vol 36, pp. 391–400.

<sup>19</sup> Parsons, K. (2014) *Human thermal environments: The effects of hot, moderate, and cold environments on human health, comfort, and performance*, 3<sup>rd</sup> ed, Boca Raton: CRC Press, Taylor & Francis Group.

<sup>20</sup> Xiang, J., Hansen, A. and Pisaniello, D. (2016) ‘Workers’ perceptions of climate change related extreme heat exposure in South Australia: A cross-sectional survey’, *BMC Public Health*, vol 11, no 16, p. 549.

address the problem.<sup>21</sup> In another study, Occupational Health and Safety (OHS), union and government representatives belonging to different industries and occupational groups across Australia described feelings of ‘powerlessness’ to reduce the negative effects of heat stress, along with a sense of inevitability over the probability of heat exposure in such a hot country.<sup>22</sup>

As heat stress reduces humans’ capacity for physical activity, it also poses serious threats to labour productivity. In addition, many of the ‘costs’ of reduced productivity are likely to be borne by workers. As workers slow down or limit their working hours to manage high-heat conditions—a form of ‘natural protection’<sup>23</sup>—economic output, pay and family income are likely to be reduced.

Some workers who are expected to meet production targets will likely have to work longer days. Workers who are paid according to production output may have to work for longer, or they may just take home less money. Other workers are less able, or unable, to slow down. Workers who are ‘externally paced’ by the speed of machines or other technology, and workers who are paid according to production (i.e., piece workers, such as fruit pickers), are severely constrained in their ability to mitigate heat stress.

## HIGH HEAT CAN INCREASE BUSHFIRES

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Although this report does not focus on the increasing prevalence and intensity of bushfires, it is important to keep in mind that climate change is increasing both the length of the bushfire seasons in Australia and the intensity of the fires themselves. This has consequences for workers, including significant smoke and particle inhalation for those fighting the fires, for those who live in fire-affected areas, and for large groups of other workers—most particularly, again, emergency workers, outdoor workers and indoor workers without air filtration systems.

The 2019-2020 bushfire season involved a significant blanket of smoke over areas of NSW, Canberra and Victoria (VIC) for some weeks—with the worst day in December 2019 in

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<sup>21</sup> Xiang, Hansen and Pisaniello (2016), p. 549.

<sup>22</sup> Singh, S.; Hanna, E.G. and Kjellstrom, T. (2013) ‘Working in Australia’s heat: Health promotion concerns for health and productivity’, *Health Promotion International*, vol 30, pp. 239–50.

<sup>23</sup> ILO (2019).

Sydney recording air pollution levels 11 times higher than the ‘hazardous’ threshold.<sup>24</sup> Workers across multiple industries were affected. Some groups of workers had to stop work due to serious threats to worker wellbeing—for example, workers at key port terminals in the city, on some road projects, and on some construction sites.

During the bushfire crisis, hospital resources were stretched dealing with respiratory-related conditions, and the long-term impacts of smoke on firefighters, emergency responders and residents are unknown. There are concerns that Rural Fire Service (RFS) volunteers have not been equipped with adequate safety equipment, with some having to resort to charitable fundraising to pay for appropriate masks,<sup>25</sup> and that the service has suffered from ongoing budget cuts.

## WHAT ARE TRADE UNIONS SAYING?

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The risks posed by climatic heat to workers in Australia have been publicly acknowledged by several trade unions and union peak bodies. For example, the Australian Council of Trade Unions (ACTU) has also called for new regulations and codes to be developed for heat-related illness and exhaustion, noting that the issue of heat stress ‘is likely to continue to worsen due to Australia’s climate, the impact of global warming and Australia’s ageing workforce’.<sup>26</sup> The ACTU argues that the current guidance material on heat stress, which is generalist and non-binding, is inadequate, and that duty-holders and workers in multiple industries are struggling to cope. During a record-breaking heatwave in December 2019, the ACTU called for OHS regulations to be updated, in recognition of the increasing climate-related heat and pollution effects on working people.<sup>27</sup>

Unions NSW have also noted that due to the increased level and duration of heat and humidity under climate change, workers are being subjected to an increased risk of heat

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<sup>24</sup> See <https://www.smh.com.au/national/nsw/nsw-bushfires-apocalyptic-health-effects-of-sydney-s-toxic-air-20191211-p53ixc.html>.

<sup>25</sup> See [https://www.abc.net.au/news/2019-12-11/nsw-bushfires-firefighters-raise-money-to-buy-face-masks/11790096&sa=D&ust=1576719306178000&usg=AFQjCNGhxEXUdz\\_AjypLS81PpnhWWDn1Cw](https://www.abc.net.au/news/2019-12-11/nsw-bushfires-firefighters-raise-money-to-buy-face-masks/11790096&sa=D&ust=1576719306178000&usg=AFQjCNGhxEXUdz_AjypLS81PpnhWWDn1Cw).

<sup>26</sup> Australian Council of Trade Unions (2018) *Review of Model WHS Laws 2018*, ACTU Submission, Safe Work Australia, <https://engage.swa.gov.au/32134/documents/78522>, p. 27.

<sup>27</sup> See <https://www.smh.com.au/business/workplace/new-work-safety-guidelines-needed-to-address-heat-and-smoke-actu-20191218-p53l6j.html>.

exhaustion, fatigue and melanoma, and they have called for a new model code of practice covering heat risk management.<sup>28</sup>

## WHAT ARE WORKERS SAYING?

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While epidemiologists and other scientists have been gathering significant quantitative data on the phenomenon of heat stress, very little qualitative information has been captured about how workers themselves are experiencing the effects of rising heat stress in their everyday lives. Most particularly, we don't often hear from workers in their own words. By better understanding how rising heat is experienced, we can work to develop workplace policies that protect workers' health and safety and ensure decent working conditions. Collecting and analysing workers' own experiences of heat stress is one of the goals of this research project.

The experience of heat stress may also provide an important way of linking the consequences of climate change with the workplace. While trade unions have been running education and political campaigns on the broader problem of climate change, the issue of heat stress may allow such campaigns to be linked concretely to the experience of work and the workplace activities of unions.

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<sup>28</sup> Unions NSW (2018) *2018 Review of the Model WHS Laws*, 13 April 2018, Safe Work Australia, <https://engage.swa.gov.au/32134/documents/78564>, p. 5.

# SECTION TWO: Heat Stress at Work—Case Studies

The mode of employment for workers in an industry, or a workplace, is likely to correlate with an employee’s experience of heat stress and their ability to manage it. Workers who are able to alter their pace of work may be able to organise their working day to minimise heat stress; those who have to work to an externally defined work schedule that has no regard to heat stress management, and those whose work is ‘paced’ by technology and other factors, are likely to be more affected. The level of organisation and unionisation within a particular group of workers is another relevant factor in the experience and management of heat stress.

Two recent case studies of different groups of workers managing high heat at work demonstrate these issues.

## CASE STUDY ONE: OUTDOOR WORKERS IN THE CITY OF SYDNEY

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In 2019, funded through a City of Sydney Council Innovation Grant, we examined the experience of two groups of outdoor workers in the City over five hot days. These workers—municipal park maintenance workers and bicycle delivery workers (food and document delivery cyclists or ‘riders’)—have vastly different levels of workplace autonomy, organisation and job security, and this impacts their ability to manage heat stress.

Workers completed surveys about their experience of heat during the working day; in addition, location, heat and humidity data were also gathered. Interviews were conducted with each worker before and after the study period, so that they could tell us in more detail how they experienced and responded to heat stress.

These are some of our important findings.

The impacts of heat stress are both physical and mental.

Heat stress is a critical issue for these outdoor workers. During the five-day study period, when temperatures were moderately high to high, about half of all respondents stated that they were hot at work, with three-quarters saying they were thirsty. In high heat, many workers reported feeling 'extra tired', finding it difficult to concentrate and having more trouble than usual completing tasks. All workers described the need to pace their work wherever possible, and to take rest breaks to enable time for relief.

Outdoor council workers described certain locations where it was particularly difficult to work in high heat: on ovals, next to main roads, and in places with no, or minimal, tree cover. Certain tasks were also particularly difficult—hedging in heavy PPE and with machinery close to the body, or driving trucks with poor air conditioning. A 'lack of any breeze', 'bushfire smoke haze' and high humidity all made working in high heat more hazardous and uncomfortable. These working conditions had significant mental and physical effects on workers.

Conditions are tough for all workers, and frightening for on-demand workers.

The outdoor council workers reported that in high-heat conditions it took them longer to complete tasks; that they were 'slower', less comfortable and irritable; and that they found it difficult to concentrate. One worker said: 'I realised that I was getting less friendly the hotter I became'. Workers also experienced sweating, 'the shakes' ('legs start to feel like jelly'), headaches, cramping, fatigue and severe dehydration for multiple hours.

Delivery riders also reported being 'slower and less efficient', 'hot and bothered' and dehydrated in high heat and humidity. In these conditions, access to clean water was an issue for many riders: public facilities were limited or broken, and it was too heavy to ride around with large amounts of water on their person. Many riders mentioned that their uniforms did not breathe or 'wick' well, compounding the effects of heat stress. On one hot day, a rider said: 'I was dehydrated and exhausted and it caused me to be a little emotionally on edge and just kind of "over it"'.

Like council workers, the riders had different strategies for avoiding heat, based on their knowledge of the city's infrastructure, including water, shade, breeze and rest spots. Some also had considerable knowledge of dedicated bicycle paths, congestion and traffic, and they sometimes used this knowledge strategically to avoid high-heat zones. Throughout

their shifts, riders often sought refuge from the heat in air-conditioned lobbies, or they asked for water at restaurants while waiting to collect deliveries.

Workplace relations are key to managing heat stress.

There was a clear difference between the two groups in how they were able to manage high heat and humidity. Relative to delivery riders, council workers were more able to change their work schedules in response to the heat, arranging for more strenuous or difficult tasks to be done during the cooler parts of the day. As one council worker put it:

The good thing about our work is that we're the ones out in the field, we're the ones determining what we actually need to do, so we can play with what we actually have to do at the time ... so there's a bit of autonomy.

Delivery riders were more likely to take extra short breaks to cope with the heat, but they had far less ability to change their duties. Furthermore, for some food and parcel delivery riders undertaking monitored piecework, working less (or more slowly) during the hottest parts of the day meant losses to income, a risk of 'deprioritisation' when bidding for future shifts and other penalties. One delivery rider summarised the situation succinctly:

The main way in which [employers] force work out of us is by paying us effectively below award or below minimum wage, which induces people to work stupidly hard, which means they can't regulate their taking of jobs during peak heat periods.

Another rider described how these economic pressures impacted their ability to rest, stay hydrated and stop work:

You don't care, you're sweating, you don't take drinks when you should, you don't rest when you should, you just don't stop. You just do it. So it's a totally different mentality.

## CASE STUDY TWO: BUILDING AND CONSTRUCTION

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Another group of highly exposed and at-risk workers are those who work in the Australian building and construction industry. Outdoor workers in this industry—including labourers, concretors, crane operators, riggers, bricklayers, formworkers and steelfixers—are particularly vulnerable. Most obviously, this is partly due to the weather-exposed and physically strenuous nature of much of their work. But there are other factors at play: the industrial environment, different working arrangements and job security, levels of union organisation, and how much control workers have over their working conditions. All of these factors have implications for the management of heat stress.

Our study of a group of workers in the NSW building and construction industry highlights how different workers are managing the issue, as well as indicating that OHS matters like heat stress may lead to increased worker mobilisation.

### Industry overview

Heat stress is a significant issue for workers in the Australian building and construction industry. Projected temperature increases are expected to elevate the risks of heat stress and heat-related issues, and, concurrently, the industry is expected to grow rapidly. The construction industry is currently the third largest employer in Australia (with 9% of all employees).<sup>29</sup> In NSW, a total of 371,332 people were employed in the industry in 2019: 84.7% work full-time, and 15.2% work part-time.<sup>30</sup> It is the fourth largest industry sector as a proportion of Gross Domestic Product (GDP), at 8%.<sup>31</sup> Employment in the construction industry is projected to grow by 10% in the five-year period to May 2023.<sup>32</sup>

There is no legislated requirement in NSW for workers to stop work at a specific temperature or humidity level. Instead, the WHS Act outlines a broad duty on Persons Conducting a Business or Undertaking (PCBU) to eliminate health and safety risks in the

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<sup>29</sup> Australian Bureau of Statistics (ABS) (2019) *Labour force statistics, Australia*, 'Table 04. Employed Persons by Industry Division of Main Job', time series spreadsheet, cat. No. 6291.0.55.003, <https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6291.0.55.003Feb%202019>.

<sup>30</sup> Australian Bureau of Statistics (ABS) (2019) *Labour force statistics, Australia*, 'Table 04. Employed Persons by Industry Division of Main Job'.

<sup>31</sup> Reserve Bank of Australia (RBA) (2019) 'Composition of the Australian economy: Snapshot', 5 June, <https://www.rba.gov.au/snapshots/economy-composition-snapshot>.

<sup>32</sup> Department of Jobs and Small Business (2018) *Employment outlook to May 2023*, <http://lmip.gov.au/default.aspx?LMIP/GainInsights/EmploymentProjections>.

workplace 'so far as is reasonably practicable' (section 19). However, Construction, Forestry, Mining, Maritime and Energy Union (CFMMEU) enterprise bargaining agreements (EBAs) in NSW allow workers to stop work and prepare for 'safe completions of critical tasks currently underway' when the ambient temperature reaches 35°C, or 28°C with above 75% humidity.<sup>33</sup>

In an industry increasingly characterised by informal and casual labour arrangements, sham contracting and fragmented labour-hire structures,<sup>34</sup> the implementation and enforcement of heat stress management policies is a significant challenge.

### What's happening on the ground?

During July 2018, 151 workers in the NSW building and construction industry were surveyed about heat at work. These workers were asked about their experience of heat stress in the workplace, their strategies for managing heat stress events in the workplace, and their views on workplace heat stress as a bargaining and/or campaign issue.

Workplace heat stress is a significant issue for this group of workers, in terms of safety, physical health and mental health. Most respondents said that on high-heat days, workplace heat stress affects them 'quite a bit', or 'very much'; and only one person said that they were never affected by it.

Common physiological effects of heat stress were fatigue or exhaustion, increased body temperature, reduced concentration and stress. Other effects included headaches, excessive perspiration, sunburn, vomiting, loss of consciousness, anxiety and frustration. Respondents said that heat stress played 'a significant [role] in (their) judgement making abilities', made them 'tire much faster', and increased the 'probability of accidents due to fatigue'.

Heat stress impacted not just work time and conditions, but also broader health and recovery beyond the workplace. Many workers described heat stress as having 'both short and long term' consequences, and noted that there were consequences for 'all (workers) on site not just the person suffering'. However, these workers faced multiple obstacles to

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<sup>33</sup> See CFMEU Construction & General (2016), What are the rules regarding heat?, Sydney (<https://nsw.cfmeu.org.au/faq/what-are-rules-regarding-heat>).

<sup>34</sup> See CFMMEU, Construction & General Division (2018), Submission to the 2018 review of the model WHS laws, May 2018, Safe Work Australia, p. 2.

managing heat stress effectively. Many felt that that their employers were not taking the issue seriously enough, and/or were acting against their interests on heat issues. Only 6.34% of respondents believed that their employers took heat stress 'very seriously', whereas 35.92% of respondents felt that their employers did not take heat stress seriously 'at all'.

Workers also noted that the current processes in place for managing heat stress were deficient or inconsistently enforced, particularly in the context of increasingly fragmented working arrangements. On some sites there were no union representatives, such as a Health and Safety delegate, and on other sites, many workers were unsure if there was one or not. One worker said: 'It seems every site has different rules!' Many workers noted that policies were overly determined by their employer's priorities.

Finally, many workers felt that the pressure to maintain a particular level of production in intense and unsafe conditions was significant and increasing. Partly because of this, the majority of workers (86%) want heat stress matters to be part of bargaining and union campaigns.

# SECTION THREE: What Are Unions Doing?

Heat stress is not a new issue for workers and their unions, but it is increasingly difficult to manage in an era of climate change. In order to better understand how unions are responding to heat stress as an OHS, industrial and organising issue, and how unions view climate change in relation to heat stress, we interviewed union officials and staff in key industries. We wanted to understand what sorts of actions are being taken by unions, and to illuminate what barriers and possibilities there are in relation to organising projects that draw together heat stress and climate change.

We conducted interviews with 12 trade union officials and staff, representing different groups of workers across the country. We interviewed people based in NT, SA, QLD, NSW and VIC. The interviewed officials represent delivery riders; firefighters; farmworkers; warehouse workers; builders; electricians; council workers; emergency service workers; logistics workers; hospitality workers; and early childhood educators. In addition, interviews were conducted with one official of the ACTU, and an organiser based at the Victorian Trades Hall Council (VTHC).

Through the interviews, we gathered data on:

- how these unions respond to heat stress;
- what sorts of actions these unions currently take on heat stress;
- how these unions view and approach the issue of climate change in relation to heat stress.

## WHAT FACTORS DO UNIONS IDENTIFY?

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For the unions we spoke to, a complex picture emerged as to how heat stress is experienced and managed in the workplace. Our research was able to identify three levels at which there were problems in managing heat stress at work:

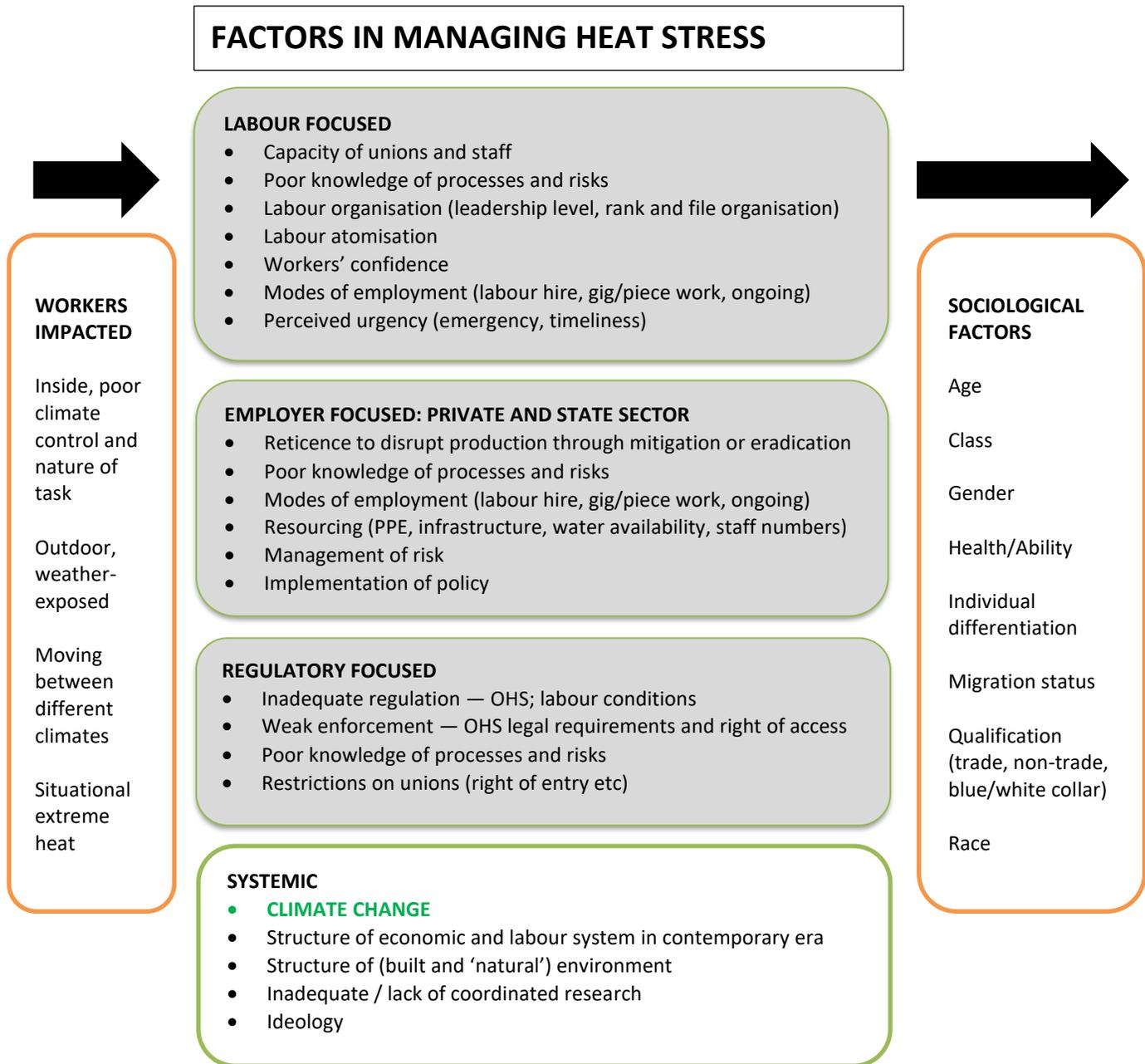
1. issues for labour at the workplace;
2. employer-focused problems (private and state sector);
3. problems with regulatory and legal frameworks.

More generally, unions identified a range of systemic and sociological factors that impact the collective and individual experience of heat stress—including the ability to eradicate it, or manage its impact and associated risks, as is required by OHS frameworks.

Interviewees identified climate change—in terms of global warming, the frequency and intensity of high-heat events, and the emergence of new weather phenomena—as a key systemic factor shaping the management of heat stress for workers and unions in the present and immediate future. Figure 1 (Unions and Heat Stress Analytic) was developed out of the interview data as a tool to scrutinise and contextualise the activities of unions on this question.

We also asked unions if and/or how they, or their members, draw together the issues of heat stress and climate change. The analytic tool summarised in Figure 1 also allows unions, other researchers and ourselves to identify potential pressure points in the management of heat stress where the context of, and risks associated with, climate change might be more prominently articulated and acted on.

Figure 1. Unions and Heat Stress Analytic



## TRADE UNION ACTION ON HEAT STRESS

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Australian trade unions are responding to heat stress in a number of different ways (see Table 1). These can be broadly categorised as:

- event-responsive actions (for example, prior to, during or after a heatwave or heat stress incident, and initiated at various locations within unions and worksites);
- education and training (at multiple levels in the process of employment and work);
- organising- or industrial-focused actions (including utilising OHS frameworks);
- policy- and regulatory-focused action (usually externally focused and seeking greater protection for workers and increased powers for regulatory bodies).

Most unions interviewed for this project took approaches that involved strategies across multiple categories, with great variation in focus and capacity to take on such work. Some unions indicated that they thought there was scope for more cross-union or national work on heat stress, including in relation to climate change. Table 1 (Union Action on Heat Stress) summarises the ways in which the unions participating in the interviews take action on heat stress at the present time.

**Table 1**  
**Union Action on Heat Stress**

<b>Event-responsive actions</b>	<b>Education and training</b>	<b>Organising/industrial-focused</b>	<b>Policy/regulatory-focused</b>
Proactive immediately prior to expected extreme weather event	Of members (meetings, website, publications, etc.)	Enterprise agreement clauses	Submissions to inquiries and reviews
Reactive to incident	Of delegates	Strategic organising in industry or sector	Legislation
Worker-initiated	Of employers	Monitoring of known problem workplaces or issues	Engaging state agencies (safe work, coronials, etc.)
Delegate-initiated	Of government and public sector	Electing / installing OHS Reps	Lobbying/political engagement
Official- or staff-initiated	Union-run training courses for OHS Representatives	Instituting well trained OHS committee	

## **TRADE UNIONS AND CLIMATE CHANGE**

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The unions interviewed for this project argued that climate change was of central importance to their members, and that it is having a significant impact on various industries. The unions identified a connection between heat stress and climate change, and observed that rising temperatures and increasingly frequent extreme weather events requiring active intervention and management of OHS risks and climate change have become a more generalised phenomenon.

That said, and as one trade union official articulated, climate change as an OHS issue also requires action on the causes of climate change to eliminate the risk—not just mitigation action adapting to impacts at the level of individual workers and worksites.

While most unions are taking some action on climate change, even if only at the policy level, few reported that they had actively campaigned on the issue within their membership or taken broader public action.

Several unions reported that members often discuss their work in the context of climate change—such as in relation to the way in which the built environment is being constructed—but that there was largely no coordinated approach or response to climate change within their organisation. A current official of a state-based firefighters union noted that workers can and do make the connection between climate change and changes in fighting fires, whether it be discussing the prevalence of grass fires, the nature of extreme fire events or the construction of buildings. A second official at a different union noted that many of their members explicitly drew connections between, for example, the effects of climate change on the agricultural and dairy industries in Australia and their job security and working conditions.

The participants were asked whether they thought the issue of heat stress could be used as a vehicle to organise around climate change, particularly as the issue of climate heat would be rooted in the everyday experience of workers. There was a mixed response to this question. Several unions thought that this was a useful approach to take, and that it would present the impacts of climate change in a concrete way for members. Others felt that while organising around heat as an OHS issue was effective, explicitly linking heat stress to climate change might be more fraught than it first appears.

One official, representing firefighters, thought that it was difficult to say whether making climate change more central in discussions of heat stress would be useful, as many of the risks for firefighters come back to resourcing (people) and money. This official gave the example of the rescue work that modern firefighters undertake, stating that responders cannot refuse to rescue an injured person from inside a car at an accident scene, regardless of how hot it is on the bitumen road. Rather, the question is whether there is sufficient resourcing to ensure that workers can switch in and out of that work and allow themselves time to recover. For example, if two teams of workers are made available, a team can work for a limited period in extreme heat conditions and then be replaced by a second team while the first team rests—working in tandem until the job is complete.

# Conclusion

Many researchers, workers and union representatives are concerned about insufficient protection for workers during high- and extreme-heat events. They are also worried that things are getting worse, as heatwaves increase in frequency and severity, and as they are coupled with other climate-related conditions such as bushfire smoke and air pollution.

Currently, many workers say that OHS processes might protect them in theory, but that in practice this does not happen. This summer has shown how catastrophic these conditions can become for workers, and how unprotected many workers currently are. Some employers are concerned with maintaining productivity and reducing costs, and this opens up a conflict between their interests and those of workers who want to stay safe. Many workers say that employers do not want work to stop even when heat stress is very high, and that employers prioritise productivity over workers' health.

Workers' representative organisations say current laws are inadequate, and that federal and state governments need to act urgently to address this failure. Workers also want employers and governments to do more about the risk of heat stress, and they want clear and accessible OHS pathways to eradicate or mitigate the risk of heat stress when it occurs. Action is needed to ensure the safety of all workers, and also to ensure that vulnerable workers receive the support and protection they need.

Workers and their representative organisations must be centrally involved in addressing how heat stress is safely managed nationally, in the states and territories, and in workplaces. To protect workers and the wider community, not only must we act to mitigate the impacts of heat stress, but we must also act on the causes of rising temperatures and changing weather patterns. We must act on climate heating itself.

## FURTHER INFORMATION

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Further analysis from our ongoing research on work in the era of climate change will be released through the [toohottowork.org](https://toohottowork.org) website, alongside other materials from the case studies discussed in this report. We are currently working on a new project to develop further insight into the experience of workers of high heat, with a focus on indoor workers and their particular needs. If you would like to contact us about our research, please email: [elizabeth.humphrys@uts.edu.au](mailto:elizabeth.humphrys@uts.edu.au).

## PUBLICATIONS AND FURTHER RESOURCES

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Articles and publications arising from this research project are listed below.

Newman, F. and Humphrys, E. (2020) 'Construction workers in a climate precarious world', *Critical Sociology*, Vol 56, Issue 4-5, pp 557-572.

<https://doi.org/10.1177/0896920519880951>.

Biloria, N.M., Goodman, J., Humphrys, E., Newman, F., Pakdel, P., da Rimini, F. and Thomas, L. (2019) 'Heat in the streets: Mapping the lived experience of heat stress of climate-exposed workers towards developing a thriving and resilient city', UTS Climate Justice Centre, Final Report to the City of Sydney.

<https://opus.lib.uts.edu.au/handle/10453/138619>

Goodman, J., Humphrys, E., Newman, F., da Rimini, F., Thomas, L., Biloria, N.M. and Pakdel, P. (2019) 'Heat stress and on-demand work: The experience of food delivery and courier cyclists', UTS Climate Justice Centre, Submission to the Inquiry into the Victorian On-Demand Workforce,

<https://opus.lib.uts.edu.au/handle/10453/134736>.

Da Rimini, F., Goodman, J., Humphrys, E. and Thomas, L. (2018) 'Towards a 'worker/citizen science' model: A qualitative investigation of workplace heat stress and climate change', Conference paper given at the *Australian Citizen Science Conference*, University of South Australia, Adelaide 7–9 February.

Ghosh, D., Goodman, J. and Humphrys, E. (2017) 'Addressing heat disease: Trade unions and climate heat in the workplace', Conference paper given at the *29th Annual Scientific Conference of the International Society of Environmental Epidemiology*, University of Sydney, 24–28 September.

## CJRC RESEARCHERS

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This report was drafted by the following CJRC members:

### ***Dr Elizabeth Humphrys***

Elizabeth Humphrys is a political economist at the University of Technology Sydney (UTS), and a member of the UTS Climate Justice Research Centre. Her current research is on neoliberalism; work in the era of climate change; and the deaths of 35 workers when the West Gate Bridge collapsed in 1970. Elizabeth's book *How Labour Built Neoliberalism* was released in 2019 (Brill & Haymarket). She is an Associate at The Australia Institute's Centre for Future Work, and was the inaugural NSW State Library Dr AM Hertzberg Fellow in 2019.

### ***Freya Newman***

Freya Newman is a research assistant at the Climate Justice Research Centre, UTS. In 2018, she completed her honours thesis at UTS on heat stress in the NSW construction industry, for which she was awarded first class honours and the University Medal.

### ***Professor James Goodman***

James Goodman conducts research into global politics, sociocultural change and climate justice. He is a Professor in Social and Political Sciences at the Faculty of Arts and Social Sciences at UTS (FASS), where he has been based since 1996. He is the Director of the UTS Climate Justice Research Centre. James draws from a disciplinary background in political sociology, international relations, political economy and political geography, and he has led several large collaborative research projects. He has published five authored or co-authored books and numerous articles in leading international journals.

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The following UTS academics were collaborators on the City of Sydney research project:

### ***Associate Professor Dr Nimish Bitoria***

Nimish Bitoria is an Associate Professor at the UTS School of Architecture. Nimish is an expert in the areas of Smart Environments and Spatial Robotics, with extensive research

and design experience across Europe and Asia. He holds a PhD in Real-time Interactive Environments from the Delft University of Technology, and a Masters in Architecture in Emergent Technologies and Design from the Architectural Association, London, UK. Nimish is currently working on the AusIndustry Smart Cities and Suburbs Program auspiced by Cumberland Council, Connected and Autonomous Vehicles; the Smart Shuttle trial project commissioned by HMI Technologies and TfNSW; Empathic care environments for dementia care, commissioned by Leigh Place Aged Care, Sydney, and; the Climate KIC Fairwater Project, funded by ARENA and Climate KiC.

***Associate Professor Leena Thomas***

Leena Thomas is an internationally recognised sustainable architecture academic at the UTS School of Architecture. Her research focuses on transforming development and design practices in response to global concerns for climate change, zero carbon development, thermal comfort, health and wellbeing in living and work environments. As Project Lead and/or Chief Investigator, Leena is instrumental in delivering a number of impactful multi-institutional government- and industry-funded research projects. These include the Fairwater Living Laboratory, Building Occupants Survey System Australia, India Model for Adaptive Thermal Comfort (IMAC) and Healthy Higher Density.

***Pejman Pakdel***

Pejman is a professional front end developer, with a graduate degree in Information Technology. He has several years of experience across different aspects of Web programming, and extensive experience working in design, and developing websites with JavaScript, React and Node.js. Since 2018, he has been working as a research assistant and developer at UTS.